

IN THE DRAWINGS:

Applicants are herewith submitting two (2) Annotated Sheets and two (2) new Replacement Sheets for Figures 1, 3 and 4. Please replace the originally filed Figures 1, 3 and 4 with the enclosed new Replacement Sheets for Figures 1, 3 and 4.

REMARKS

In the Office Action, the Examiner rejected Claims 1-18, which are all of the pending claims, over the prior art, principally U.S. Patent 6,269,322 (Templeton, et al.). In particular, Claims 1-5, 14 and 16-18 were rejected under 35 U.S.C. 102 as being fully anticipated by Templeton, et. al, and Claims 6, 7 and 15 were rejected under 35 U.S.C. 103 as being obvious over Templeton, et al. in view of U.S. Patent 5,734,594 (Chu, et al.).

The Examiner also objected to the drawings. Specifically, the Examiner noted that there is an unlabelled item in Figure 1, and that Figures 3 and 4 should be designated as "Prior art." The Examiner required correction of the drawings.

This opportunity is being taken to amend independent Claims 1, 8, 12 and 16 to better define the subject matters of these claims. In addition, Applicants are herewith submitting amended Figures 1, 3 and 4 to address the Examiner's objections to the drawings.

With respect to the drawings, Figure 1 is being amended to add a reference number "17" to reference the previously unlabelled item, which is an exposure apparatus or system. The specification is also being amended to specifically identify the exposure apparatus and to include this reference number. This exposure apparatus is known in the art and is represented in Figure 1 in a standard manner. Those of ordinary skill in the art would readily recognize that this item is an exposure apparatus, and thus expressly identifying the item as such in the specification is not new matter. Also, Figures 3 and 4 are being labeled "Prior Art." It is believed that these changes overcome all of the Examiner's objections to the drawings, and the Examiner is thus asked to reconsider and to withdraw these objections.

Further, Claims 1-18 patentably distinguish over the prior art because the prior art does not disclose or suggest the features described in independent Claims 1, 8, 12 and 16 and used to determine the grid parameters of the photolithographic tool, independent of the field parameters of that tool.

The present invention, generally, relates to methods and systems for determining grid offsets for a photolithography tool. As discussed in detail in the present application, integrated circuits require many levels of layers that must be properly placed relative to one another. Because of this, steppers, which are used extensively in the manufacture of large-scale integrated circuits, include an alignment system to aid in achieving the proper relative placement of the levels.

The very first level to be printed on the wafer, however, does not have access to alignment marks, and thus this first level is exposed without the use of the alignment system. In order to insure optimum overlay for subsequent levels, it is critical that the first level be exposed with known placement characteristics. To achieve these results, it is important that field systematic parameters match the associated grid parameters, and the first level placement characteristics be consistent from lot to lot.

The present invention helps achieve these results by allowing grid terms, in a photolithography procedure, to be measured independently of field terms. The present invention does this by providing a plurality of artifacts on a wafer stage a known distance apart and outside of the area of that wafer stage on which the wafer substrate is placed. The distance between these artifacts is measured using the alignment system of the photolithographic tool, and this measured distance is compared to the known distance between the artifacts to determine the grid parameters of the wafer stage of the photolithographic tool, independent of

field parameters of that tool.

Templeton, et al. discloses systems and methods for aligning a wafer. There is, thus, a very important general difference between Templeton, et al. and the present invention. Specifically, Templeton, et al. relates to wafer alignment, while the instant invention relates to determining grid parameters of the photolithographic tool.

This general difference is reflected in a number of more specific differences between this invention and Templeton, et al. One significant, specific difference is that, with the present invention, the artifacts are placed on the wafer stage, while in Templeton, et al, the alignment marks are not on the wafer stage.

With regard to this point, the Examiner, in the Office Action, argued that Templeton, et al. discloses placing the alignment marks on the wafer stage, and cited, for example, Figures 11a-d of Templeton, et al. These figures are discussed in column 10, lines 42-65 of Templeton, et al, and there it is explained that these alignment marks are placed on reticle 260. Alignment marks are also discussed in the Abstract of Templeton, et al, where it is explained that these marks are printed on a surface layer of the wafer.

Thus, the alignment marks disclosed in Templeton, et al. are not located in the same place, and are not used for the same purpose, as the artifacts used in the present invention.

Independent Claims 1, 8, 12 and 16 are being amended to emphasize the differences between these claims and Templeton, et al. In particular, each of these claims, as presented herewith, describe the feature that the alignment marks are located on the wafer stage, outside of the area thereof on which the wafer or wafer substrate is placed, and that these marks are used to determine the grid parameters of the photolithographic tool, independent of the field parameters of that tool.

The other references of record have been reviewed, and these other references, whether considered individually or in combination, also do not disclose or suggest this use of the artifacts of this invention.

For example, Chu was cited for its disclosure of artifacts and for measuring distances between these artifacts. Chu, in column 1, lines 21-25, expressly indicates, though, that the artifacts shown in Figure 1A, which was specifically cited by the Examiner, are on wafer W. Because of this, Chu, like Templeton, et al. actually teaches away from the present invention.

Because of the above-discussed differences between Claims 1, 8, 12 and 16 and the prior art, and because of the advantages of those differences, Claims 1, 8, 12 and 16 patentably distinguish over the prior art, and are allowable. Claims 2-7 are dependent from Claim 1 and are allowable therewith; and Claims 9-11 are dependent from, and are allowable with, Claim 8. Likewise, Claims 13-15 are dependent from, and are allowable with, Claim 12, and Claims 17 and 18 are dependent from Claim 16 and are allowable therewith. The Examiner is, accordingly, respectfully requested to reconsider and to withdraw the rejection of Claims 1-5, 8-14 and 16-18 under 35 U.S.C. 102 and the rejection of Claims 6, 7 and 15 under 35 U.S.C. 103, and to allow Claims 1-18.

For the reasons set forth above, the Examiner is asked to reconsider and to withdraw the objection to the drawings, the rejection of Claims 1-5, 8-14 and 16-18 under 35 U.S.C. 102 and the rejection of Claims 6, 7 and 15 under 35 U.S.C. 103, and to allow Claims 1-18. If the Examiner believes that a telephone conference with Applicants' Attorneys would be advantageous to the disposition of this case, the Examiner is requested to telephone the undersigned.

Respectfully submitted,

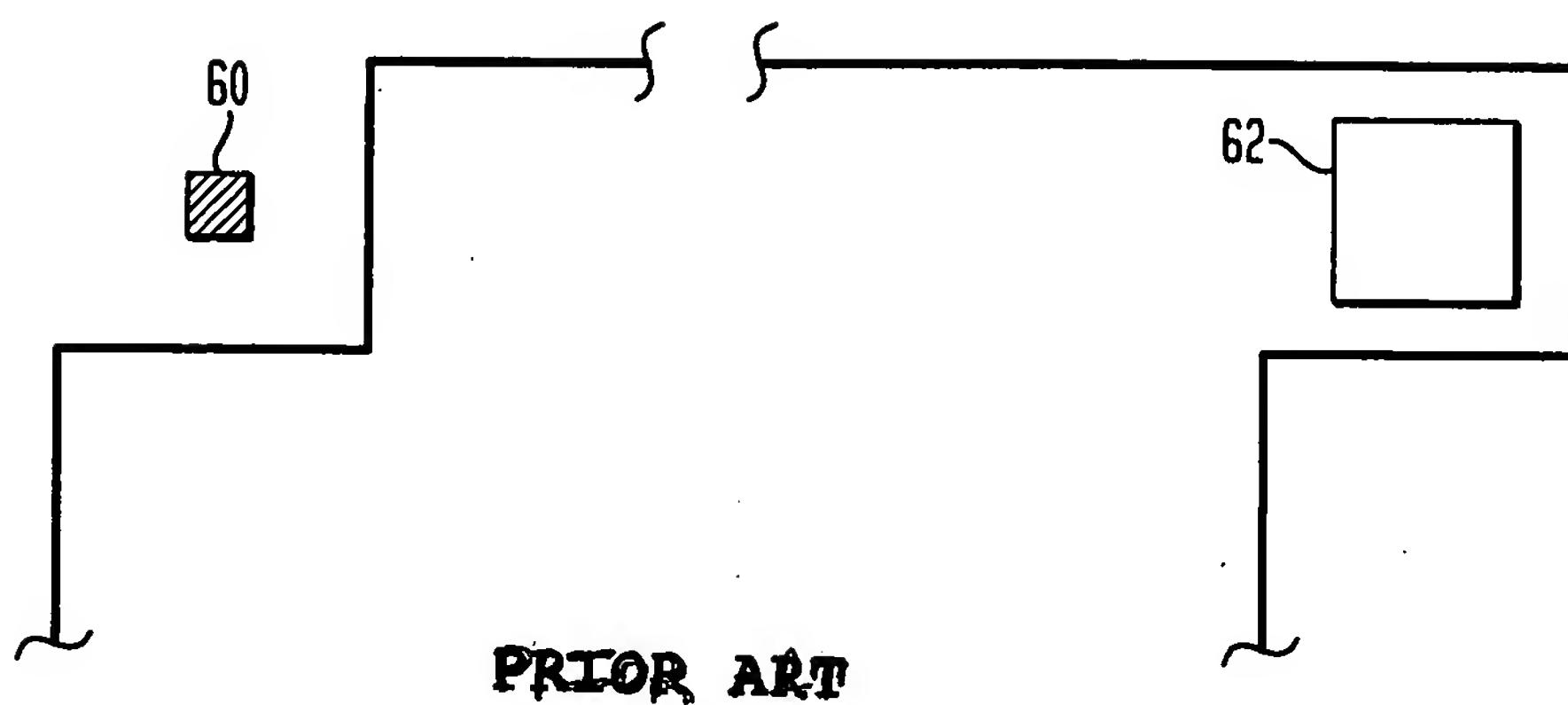
John S. Sensny
John S. Sensny
Registration No. 28,757
Attorney for Applicants

SCULLY, SCOTT, MURPHY & PRESSER
400 Garden City Plaza – Suite 300
Garden City, New York 11530
(516) 742-4343

JSS:jy

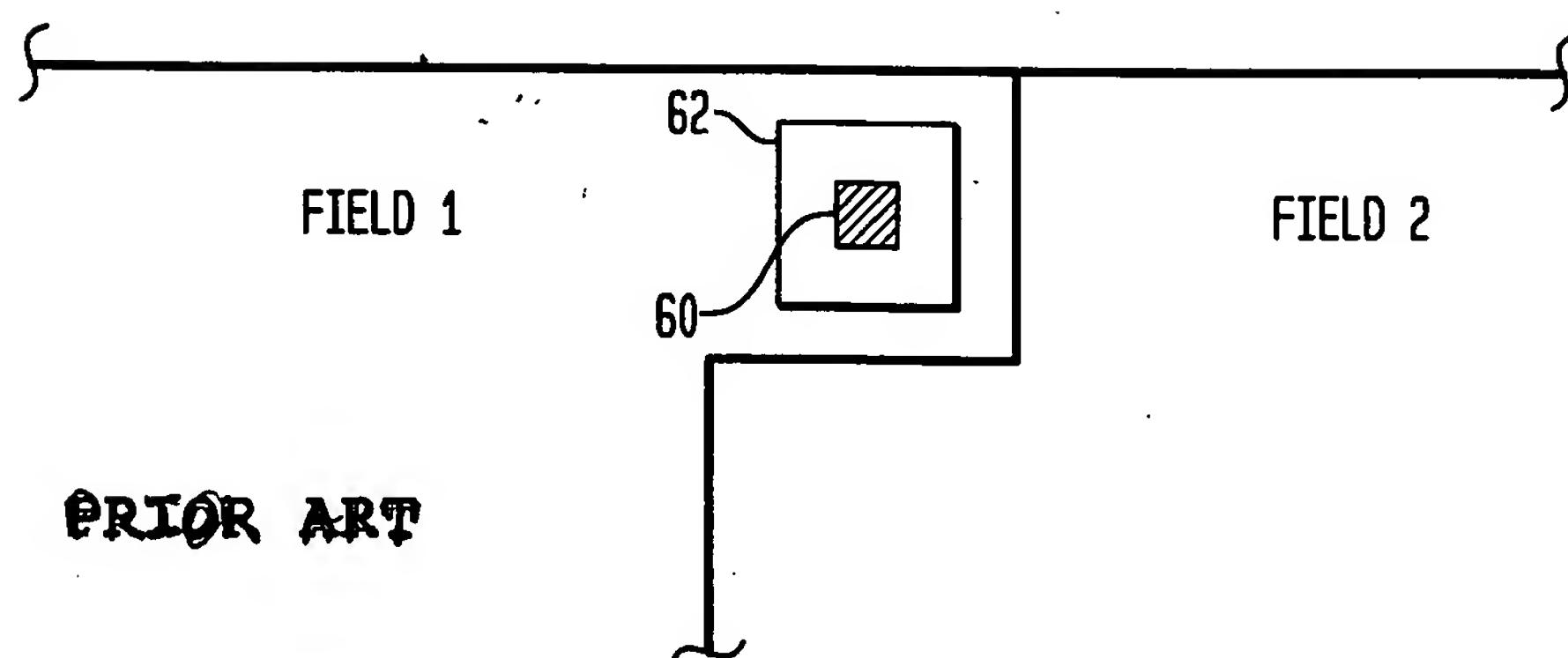
Enclosures: Two (2) Annotated Sheets of Figures 1, 3 and 4; and
Two (2) Replacement Sheets for Figures 1, 3 and 4

FIG. 3



PRIOR ART

FIG. 4



PRIOR ART

FIG. 1

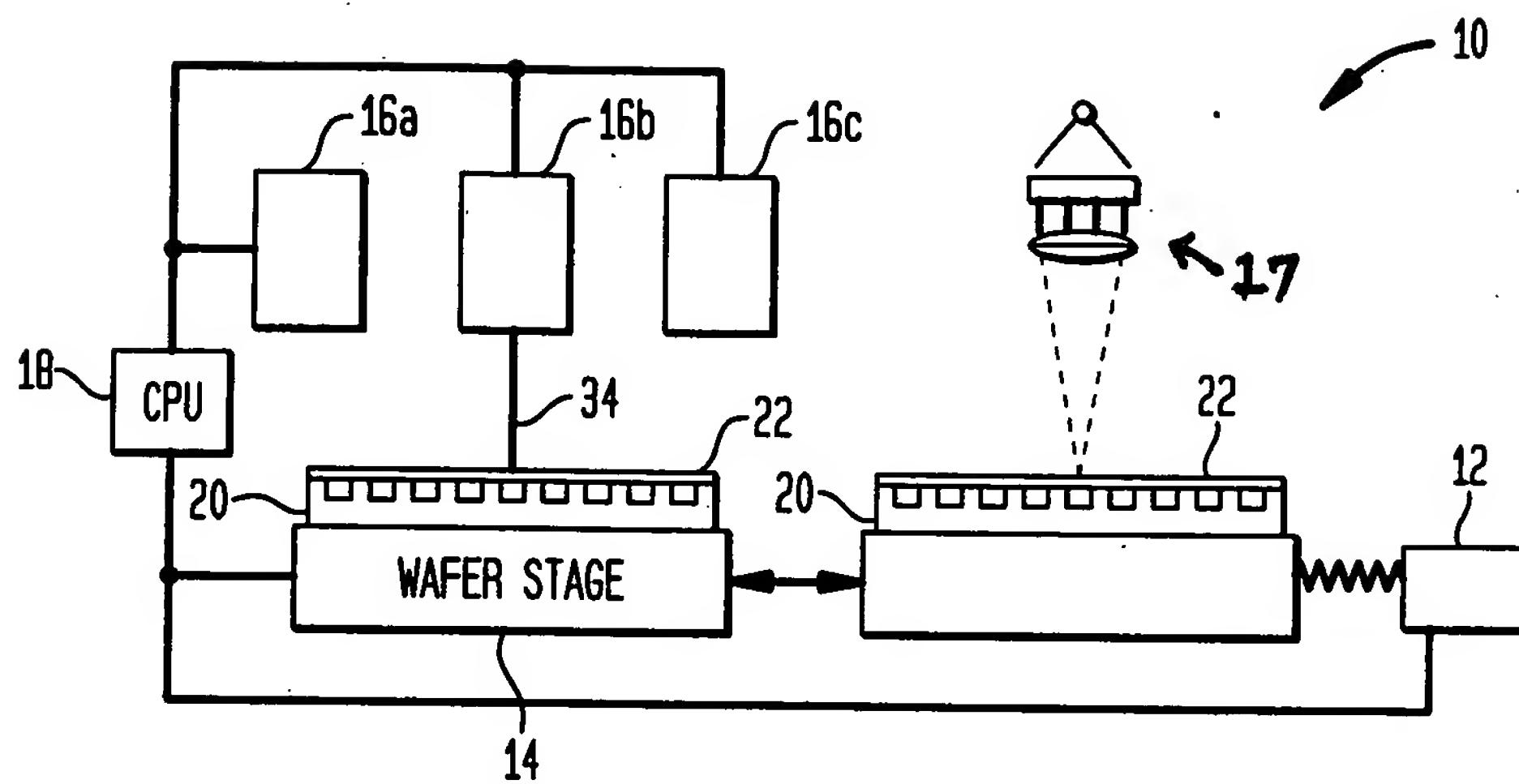


FIG. 2

